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10/781,999	02/19/2004	Shuichi Ohkubo	17449	5322

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EXAMINER	
VERDERAME, ANNA L	
ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 11/27/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/781,999	OHKUBO, SHUICHI
	Examiner	**Art Unit**
	Anna L. Verderame	1756

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 02/19/04, 04/17/06,0 6/13/05,02/13/06.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-10 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-10 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 19 February 2004 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date 4/17/06, 2/13/06,06/13/05

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.+-

2. Claims 1,2,4,7,9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seo *et al.* (JP 01-180387) and further in view of Bechevet *et al.* (JP 2002211137).

Bechevet *et al.* teaches an optical disk, shown in figure one, comprising two access levels, the second access layer, that distant from the laser source is read through the first recording composite. The first and second access levels are mutually estranged by a spacer and the whole is put between a first transparent substrate and a second substrate. The medium is intended to be read through the transparent substrate. The first recording composite comprises a dielectric layer, a phases change ingredient layer, an optical interference layer, a translucent heat dissipation layer, and other optical interference layers. The second recording composite, located distant from the laser source, is equipped with a reflecting layer applied to a spacer, a dielectric layer, a phase change record layer, a second dielectric layer and heat sink/reflecting layer(0009-0011). The composition of dielectric and interference layers formed on either side of the recording layers is preferably $ZnS-SiO_2$, SiO_2, Si_3N_4, or GeN(0019). The phase change recording layers each have two stable states that are controlled by the laser beam(0018). Table 1 shows that the index of refraction(n) and the absorption

coefficient (k) of the phase change materials differs between the crystalline and amorphous states(0023). The phase change composition chosen for this application consists of germanium, indium, antimony and tellurium and is chosen for its known property of improving endurance and writing speed in optical recording medium with one access level(0014). The metal alloy of specific composition, $[(Ge_yTe_{1-y})_a(Sb_zTe_{1-z})_{1-a}]_{1-b}(In_{1-x}Te_x)$ where $0.4 \leq y \leq 0.6$, $0.3 \leq z \leq 0.5$, $0.3 \leq a \leq 0.5$, $0.01 \leq b \leq 0.3$, is used as the phase change composition of the first access layer. The phase change layer can be as little as 6nm (0019).

The examiner holds that both the translucent heat dissipation layer and the opaque heat dissipation layer are reflective. Further, the examiner holds that the translucent heat dissipation layer must be thin and that it fulfills the functions of being both reflective while at the same time enabling the laser to access the phase change composition of the second recording composite.

Bechevet et al. also makes a single layer optical recording medium, shown in drawing three, comprising a glass substrate, a dielectric layer composed of $ZnS\text{-}SiO_2$, a 20 nm thick phase change layer, a second $ZnS\text{-}SiO_2$, and finally an aluminum reflective layer. The composition of the phase-change recording layer is an alloy of GeInSbTe that is rich in Tellurium and Germanium. The phase-change recording layer is accessed through the glass substrate(0024-0025).

Seo *et al.* teaches a phase change composition used in an information recording medium having the specific composition $(Te_{100-7}Ge_y)_{100-x}(In_zSb_{100-z})_x$ where the values of x, y, and z are in the ranges of $2 \leq x \leq 30$, $40 \leq y \leq 60$, and $5 \leq z \leq 60$. This composition

has the atomic percentages of 28-58.8% for Te, 39.2-42% for Ge, 0.1-18% for In, and 1.9-12% for Sb. The use of protective layers on one or both sides of the recoding layer is disclosed (abstract).

It would have been obvious to one of ordinary skill in the art to make a phase change composition, within the limitations of the Seo *et al.* reference, where x=12, y=40 and z= 10 so that the atomic percentages of each atom are 52.8%-Te, 35.2%-Ge, 1.2%-In, and 10.8%-Sb, this composition is within the range recited in the claims, and further to use this composition in the medium having the structure taught by Bechevet with the reasonable expectation of forming a useful optical recording medium and in the case of the two layer media with the double recording capacity. Further, it would have been obvious to use layers 6-13 nm thick based upon the direction in Bechevet at (0019).

The composition taught in this application has atomic percentages of 30.7-38% for Ge, 52.3-53% for Te, 0-15% for Sb, and .3-9.5% for In.

3. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seo *et al.* (JP 01-180387) and in view of Rie *et al.* (EP 1 172 811).

Rie et al. teaches, in example 3 of this reference, the manufacture of the two layer optical recording medium shown in figure one. First, as the substrate, a polycarbonate disk was prepared. On this substrate the first dielectric layer(45nm), the first interface layer(3), the first recording layer, the second interference layer(3nm), the second dielectric layer(11nm) , the third interference layer(3nm) , the first reflective

layer(10nm), the fourth interference layer(3nm), and the third dielectric layer(23nm) were formed successively by sputtering. The thickness of the first recording layer was varied in a range of 3-9nm. The interference layers of this embodiment were formed of GeN and the dielectric layers were formed of ZnS-SiO_2. A material represented by the $(Ge\text{-}Sn)_4Sb_2Te_7$ was used for the first recording layer. Next, a second substrate was prepared. On this substrate the second reflective layer(80nm) the seventh interference layer(3nm), the fifth dielectric layer(11nm), the sixth interference layer(3nm), the second recording layer(12nm), the fifth interference layer(3nm), and the fourth dielectric layer(65nm) were formed by sputtering. An Ag allow was used for the second reflective layer. GeN was used for each interference layer and ZnS-SiO_2 was used for each dielectric layer. The material of the phase-change recording layer was represented by a composition formula $Ge_4Sb_2Te_7$. Thereafter, the first and second information layers were attached to eachother via a UV-curable resin (0014-0019).

The material of the second recording layer may be a material such as Ge-Sb-Te, or In-Sb-Te. Alternatively, a material obtained by adding one element of the selected group, which includes In to the above mentioned materials can be used(0071).

It would have been obvious to one of ordinary skill in the art to make a phase change composition, within the limitations of the Seo *et al.* reference, where x=12, y=40 and z= 10 so that the atomic percentages of each atom are 52.8%-Te, 35.2%-Ge, 1.2%-In, and 10.8%-Sb, this composition is within the range recited in this application, and to use the composition above as the ingredient of the phase change layers of the two-layer optical recording medium disclosed in the Rie *et al.* reference

based on the disclosure to do so at (0071) with a reasonable expectation of forming a fully functional optical recording medium with doubled recording capacity. Note claims 4,5,8,and 9 are met by a medium with partially reflecting layer.

4. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seo *et al.* (JP 01-180387) and further in view of Rijpers *et al.* WO 03/044786.

Rijpers et al. teaches an embodiment, shown in figure one, of a multi-stack optical data storage medium for rewritable recording by means of a focused laser-light beam. The medium has a substrate 1, made of polycarbonate with deposited on a side thereof: A first recording stack comprising a phase-change type recording layer. The first recording stack is most remote for the focused laser-light beam, a second recording stack comprising a phase-change type recording layer, and a transparent spacer layer between the recording stacks. The recording layer of the first recording stack comprises the compound with atomic composition $Ge_{5.0}In_{5.5}Sb_{65.0}Te_{24.5}$ and has a thickness of 10 nm. An Ag reflective layer with a thickness of 100 nm is present in the first recording stack at a side of the recording layer of the first recording stack most remote from the other recording stack. A dielectric layer comprised of $(ZnS)_{80}(SiO_2)_{20}$ is present between the recording layer and the metal reflective layer. A heat sink layer made of $HfN_{1.2}$ is present in the first recording stack at the side closest to the second recording stack. The thickness of the heat sink layer is preferably 5-200 nm (6/30). The recording layer of the second recording stack comprises a compound with atomic composition $Ge_{5.0}In_{5.5}Sb_{65.0}Te_{24.5}$ and has a thickness of 6nm. A heat sink layer made of $HfN_{1.2}$ having a thickness of 80 nm is present in the second recording stack at the side closest

to the first recoding stack adjacent to the transparent spacer layer. A further heat sink layer mad of $HfN_{1.2}$ having a thickness of 100nm is present in the second recording stack at the side of the recording layer of the second recording stack opposite from the side of the other heat sink layer. Two dielectric layer are present both having a thickness of 20nm and made of the compound $(ZnS)_{80}(SiO_2)_{20}$ are present in contact with the recording layer of the second recording stack. Last a protective layer made of a laser-light transparent UV curable resin is present adjacent to the further heat sink layer. The protective layer may also be a sheet of polycarbonate that would not be laser-light transparent (10/10-11/10). The substrate may be opaque when the laser-light beam enters the stack via the side opposite from the side of the substrate (8/33-34).

It would have been obvious to one of ordinary skill in the art to make a phase change composition, within the limitations of the Seo *et al.* reference, where x=12, y=40 and z= 10 so that the atomic percentages of each atom are 52.8%-Te, 35.2%-Ge, 1.2%-In, and 10.8%-Sb, this composition also meets the ranges recited in this application, and to use the composition above in the recording layer of the first and second recording stack of the optical recording medium disclosed in the Rijipers *et al.* based on the disclosure to do so at (10/21) and (10/30) with a reasonable expectation of forming a fully functional optical recording medium with doubled recording capacity.

5. Claims 4-5 and 9-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Seo *et al.* (JP 01-180387) and further in view of Ogawa *et al.* 6,335,069.

Ogawa *et al.* teaches the manufacture of a phase change optical disk comprising a substrate, a reflection layer, a first dielectric layer, a recording layer, a second dielectric layer, a second reflective layer, a UV resin coated on the second reflective layer. First, on a polycarbonate substrate having grooves for a laser beam were deposited a light absorption layer made of Au to a film thickness of 10 nm, a first dielectric layer comprising a mixture of ZnS and SiO_2 to a film thickness of 110nm, a recording layer comprising Ge, Te, and Sb to a film thickness of 11nm, a second dielectric film comprising the same material as the first dielectric layer to a film thickness of 37 nm, and a reflection layer comprising AlTi(Ti 2% atomic) to a film thickness of 70nm. Finally, a UV-curable resin was coated on the reflection layer and cured. The recording layer of the thus obtained optical disk was in an amorphous state and the disk had a reflectivity at a wavelength of 680 nm of 16.9% . Further, in the case where the recording layer of the optical disk was in the crystalline state, the reflectivity was 4.3% (9/10-40). It is further disclosed that as the material for the recording layer Ge-Te-Sb series alloys and Ge-Te-Sb-Bi series alloys are used preferably. Further, the alloys above may be incorporated with a series of elements which includes In (8/12-18).

The examiner holds that the first gold layer is transparent to the laser beam and that the AlTi layer is fully reflective.

It would have been obvious to one of ordinary skill in the art to make a phase change composition, within the limitations of the Hisaya *et al.* reference, where x=12, y=40 and z= 10 so that the atomic percentages of each atom are 52.8%-Te, 35.2%-Ge, 1.2%-In, and 10.8%-Sb, and to use the composition above in the recording layer of the

optical recording medium disclosed in the Ogawa *et al.* based on the disclosure to do so at (8/12-18) with a reasonable expectation of forming a fully functional optical recording medium.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna L. Verderame whose telephone number is (571)272-6420. The examiner can normally be reached on M-F 8A-4:30P.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on (571)272-1385. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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GROUP 1100 / 1752